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Performance analysis of road traffic noise by using computer aided modeling

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ABSTRACT

In the recent years transportation projects in India have created excessive noise pollution which is displeasing the activity or balance of human and animal life. Noise health effects are both health and behavioral in nature. Noise can damage physiological and psychological health of human being. Noise pollution can cause annoyance and aggression, hypertension, high stress levels, hearing loss, sleep disturbances. Amaravati is a second largest and important city in Vidharbha region. As Amaravati is developing area and a good education centre is a rapid urbanization and alarming growth of population is causing serious environmental problems. Noise is one of the environmental problem that uncomforts in daily life. In the present study for recording the various noise parameter digital sound meter was used. Traffic volume data was also collected on the express highway. The variation in noise level and traffic volume data are studied and presented in the graphical form for the selected location. The study also includes the remedial measures for the management of noise.

1. INTRODUCTION

The word "noise" is derived from Latin word "nausea" meaning seasickness. Noise, defined as unwanted or excessive sound, is an undesirable by-product of our modern way of life. We experience noise in number of ways. The environmental effect of transportation project has come under close scrutiny in recent years. Noise is an inevitable part of everyday life – the television, a plane flying overhead, a faulty muffler on the passing car, dog barking, children laughing. Mild noise can be annoying, excessive noise can destroy a person hearing. People do not easily become accustomed to noise. The slightest unwanted sound can become very annoying if it continues for any length of time. While some nearby residents may ignore the continuous hum of busy freeway, other will never be able to ignore it and increasingly will find it irritating. Sound is a form of energy that is transmitted by pressure variation which the human ear can detect. When one plays a musical instrument, say a guitar, the vibrating chords set air particles into vibration and generate pressure waves in the air. People nearby may then hear the sound of the guitar when the pressure waves are perceived by the ear. Sound can also travel through other media, such as water or steel.

Apart from musical instrument, sound can be produced by many other source –mans vocal card, a running engine, a vibrating loudspeaker diaphragm, an operating machine tool, and so on. Noise perception is subjective. Factor such as the magnitude, characteristics, duration and time of occurrence may affect ones subjective impression of the noise.

1.1 Aims and Objective of propose study involve

Aims:-

1. To Find The Traffic Load On The Highway.
2. To Analyze The Traffic Load On The Highway.
3. To Find The Noise Produce On The Highway.
4. To Find The Noise Effect On The Residents Nearby Highway.
5. To Find The Noise Reduction Methods.
6. To Study The Proper Noise Analysis Process.
7. To Give The Overall Result Of The Study.
8. To Produce The Proper Documents In Fever Of The Study.
9. To Make The Report On Research Made On The Traffic Noise Analysis On Highway.

Objectives:-

The objective of this exercise is to assess the impact of various noise sources on general citizen and to compare the noise levels with Ambient Noise Standards for the area. Further, to create the awareness and educate the public.

The purpose of our project is keeping into account the noise pollution. We focus us to what extend noise has increase. Noise has much of contribution in pollution. It is increasing day by day we also focus on analyzing noise level at various placement. The factors contributing it analysis has done per its effect on human being and it was found that it was found that it has various ill effect on health of human being the remedies for reducing noise include the after

acoustic part which contain which for reducing noise by using structure barrier of material high noise absorption coefficient.

2. REVIEW OF LITERATURE

Psychologically, noise can be defined as simply, "Unwanted Sound" or a sound with which modern civilization cannot reasonably put up. In scientific parlance, noise (or sound) is a pressure oscillation in the air, water of any medium which radiates away from the source. Noise is one of the most pervasive environmental problems. A recent report on noise indicates that between 80 -100 million peoples are bothered by environmental noise on daily basis & approximately 40 millions are adversely affected in terms of health. Relative to the occupational environmental hearing loss primarily due to noise is considered to be leading occupational disability. Since, noise is the byproduct of human activity, the area of exposure increases as a function of population growth, mobility & such activities as power generation.

As per definition of noise, any sound independent of loudness that can produce an undesired psychological effect in an individual and that may interfere with social ends of an individuals or group. These social ends include all of our activities like communication work, rest, recreation and sleep etc. It is known that noise of sufficient intensity and duration can induce temporary or permanents hearing loss, ranging from slight impartment to nearly total deafness. [2]

J.K. Jain studied the impact of the constructions activities on existing highway SH-45 (now NH -58) by taking observations for volume, speed, noise level and suspended particulate matter. [3] Four stations were selected, two were on constructions sites, one away from constructions site and one at Roorkee. Noise level was found to be high at first and second construction sites.

Agrawal studied the environmental impacts of four lanes, such as noise and air pollution of the selected site on NH-2, out of which first was already four laned, second on the construction site where two lanes were blocked for the construction activities and the third on the two lane highway [4]. In all the three locations revealed that even the minimum noise level was also higher than the maximum recommended limit of 65dBA .The maximum noise level was observed at the construction site due to operation of equipments.

Reddy studied traffic related environmental factors such as noise and air pollution at some selected locations in Delhi metropolitan city. At about 12 busy intersections on NH -2 [5], the noise level and the traffic volume was recorded. Result shows that even minimum noise level limit was higher than the maximum recommended limit of 65 Dba.

3. METHODOLOGY

3.1 Site Selection Criteria

Several scouting trips were conducted to identify appropriate sites for the noise measurements. At first it was hoped that aerial photographs and GIS records could be used to identify sites, but when the first sites were investigated in person, it was found that they had undesirable characteristics which could not be filtered through either of these methods.

Thus, several trips were required to identify enough sites that would meet the criteria and be appropriate for the measurement methods.

The final criteria included:

- The dominant species must be coniferous (the dominant species is defined as the species that dominates the forest canopy)
- The site must be at least 20 m (65.6 ft) deep (tree depth)
- The site must be level in grade and even with the road
- The site must be accessible for measurements (researchers able to enter woods to take measurements; no posted private land; stay within VDOT right-of-way to the degree possible)
- The site must be safe for the roadside researcher to take noise measurements and traffic counts
- There must be a safe place to park the research vehicle
- If there are deciduous trees at the site, they must not yet be leafed out

The measurement of linear distance from the roadway is complicated in such conditions, requiring the use of surveying equipment beyond the scope of the study. The measurements at such sites make it almost impossible to achieve equal height of the measuring equipment above the roadway to ensure controlled experimental conditions. It should be noted, however, that sites with hills and embankments are ultimately desirable, both for aesthetic and noise reduction reasons, whether or not there are trees at the sites. [9]

3.2 Traffic noise model and analysis process

- **Look up table**

Implication	Noise Density	Plantation of tree
Tree	99-110	More
	90-98	Medium
	0-89	Less

implication	No. Of vehicles	Pavement required or not required
pavement	2w =20-60	Required
	3w =10-40	
	4w =10-40	
	4+w=10-40	

implication	No. Of vehicles	Pavement required or not required
pavement	2w =<20	not Required
	3w =<10	
	4w =<10	
	4+w=<10	

implication	No. Of vehicles/ noise density	Barrier may required/must required/ not required
barrier	4w= 20-25	may Required
	4+w=15-20	
	Noise density=>99	

implication	No. Of vehicles/ noise density	Barrier may required/must required/ not required
barrier	4w= 25-50	must Required
	4+w=20-50	
	Noise density=>99	

implication	No. Of vehicles/ noise density	Barrier may required/must required/ not required
barrier	4w= <25	not Required
	4+w=<20	
	Noise density=<99	

implication	No. Of vehicles/ noise density	Barrier required/not required
Pavement/barrier	2w=20-60	Required
	3w=10-40	
	4w=25-50	
	4+w=20-50	
	Noise density=>99	

implication	No. Of vehicles/ noise density	Barrier required/not required
Pavement/barrier	2w=<20	Not Required
	3w=<10	
	4w=<25	
	4+w=<20	
	Noise density=<99	

So the above condition for the performance analysis of road traffic noise by using computer aided modeling. We have consider the mathematical modeling for analysis of traffic noise.
So the mathematical modeling for pavement and barrier. We have consider the following consideration

```
if ((twow > 19 && twow < 60) || (threew > 9 && threew < 40)) && ((fourw > 24 &&
fourw < 51) && (fourpw > 19 && fourpw < 51) && (nd > 99))
'Pavement + Barrier - Required');
```

```
else
'Pavement + Barrier - Not Required');
End
```

1) Let's consider 2w=22,3w=25,4w=27,4w+=40,nd=100 then according to above equation this condition is satisfied in first if statement that's why it will show as "pavement + barrier- required".

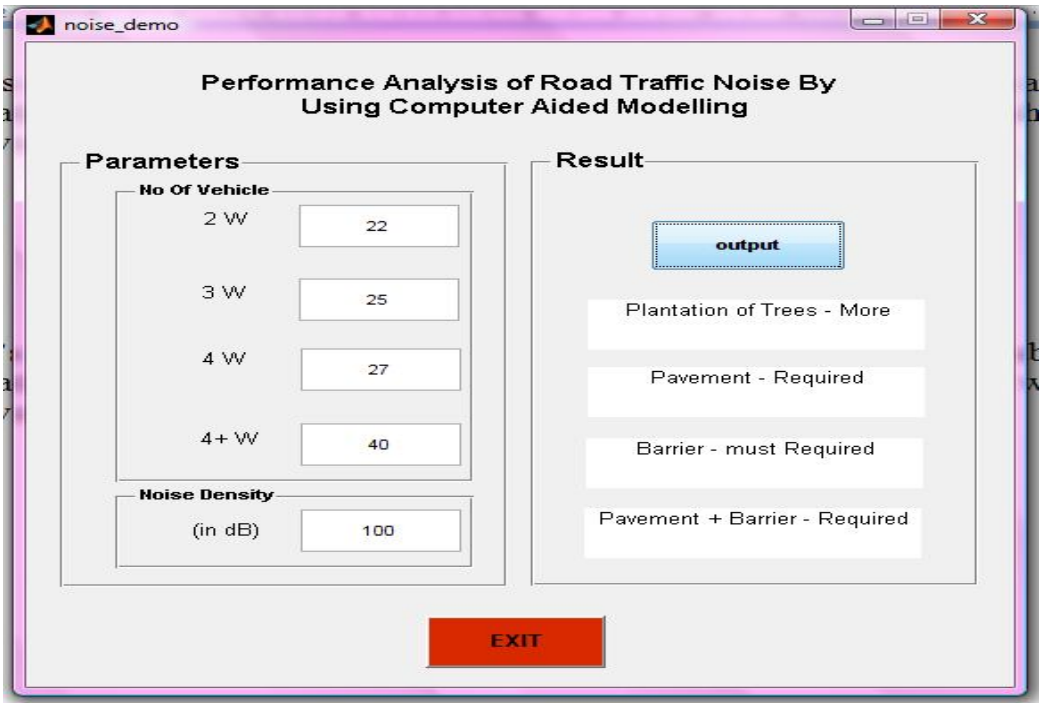

Figure 3.1: mathematical modeling for pavement and barrier

2)Let's consider 2w=15,3w=06,4w=05,4w+=10,nd=85 then according to above equation this condition is satisfied in second else statement that's why it will show as "pavement + barrier- not required

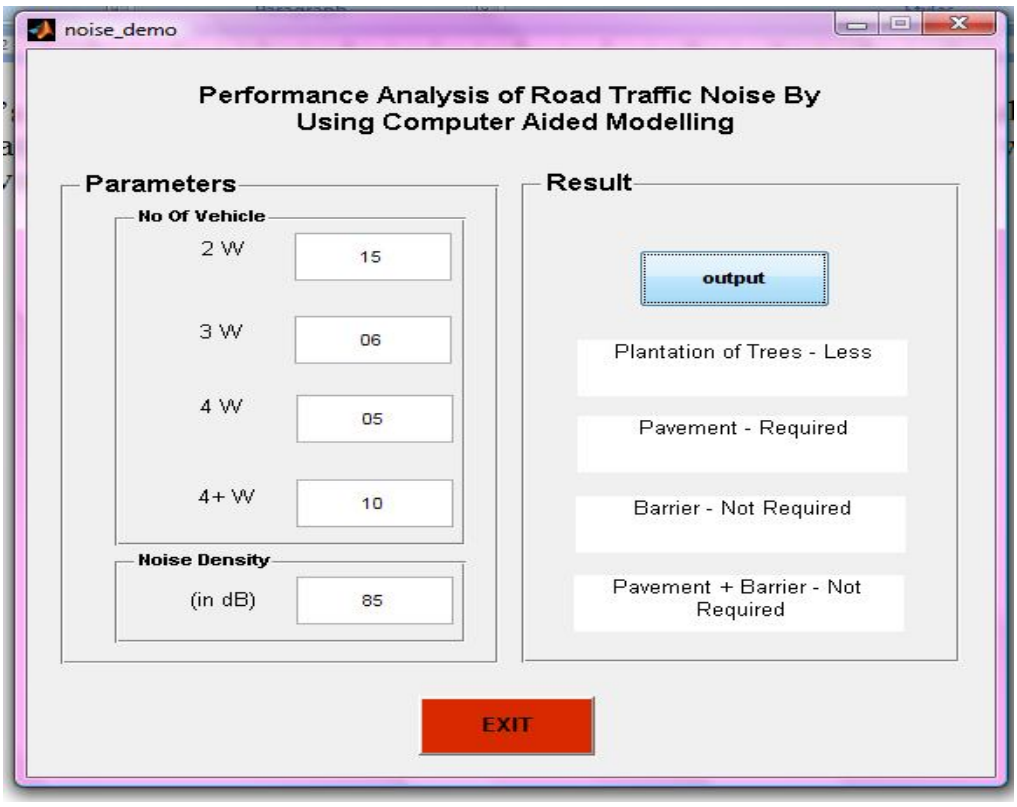

Figure 3.2: mathematical modeling for pavement and barrier

3.3 MATLAB contains

Matlab is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis, and numeric computation. In addition to the intellectual property functions provided in Matlab, the software packet is uniquely adept with vector and array based waveform data at the core of algorithms, which is suitable for applications such as image and video processing. Matlab-Simulink is an environment for multi-domain simulation and Model-Based Design for dynamic and embedded systems. It provides an interactive graphical environment, event-driven simulator, and extensive library of parameterize able functions that allow design, simulate, implement, and test a variety of time-varying systems, including communications, controls, signal processing, image and video processing. Matlab-Simulink is used in this application as the high level development tool in the design process.

1) MATLAB Simulink:

MATLAB software tool is used for developing program for different equations and algorithms. With the help of MATLAB tool it is more convenient to use simulink library where in various readily available block sets are available by which any system can be easily designed. The main advantage of MATLAB is that it can be easily interfaced with Code Composer Studio (CCS 3.1). MATLAB, developed by Math Works Inc., is a software package for high performance numerical computation and visualization. The combination of analysis capabilities, flexibility, reliability, and powerful graphics makes MATLAB the premier software package for electronics engineers

It is an interactive tool for modeling, simulating, and analyzing dynamic systems. It enables you to build graphical block diagrams, simulate dynamic systems, evaluate system performance, and refine your designs. Simulink integrates seamlessly with MATLAB, providing you with immediate access to an extensive range of analysis and design tools. These benefits make Simulink the tool of choice for control system design, DSP design, communications system design, and other simulation applications. Simulink systems are often referred to as dynamic systems. Simulink can be used to explore the behavior of a wide range of real-world dynamic systems, including electrical circuits, shock absorbers, braking systems, and many other electrical, mechanical, and thermodynamic systems.

2) MATLAB :

MATLAB is a matrix-based language. Since operations may be performed on each entry of a matrix, "for" loops can often be bypassed by using this option. As a consequence, MATLAB programs are often much shorter and easier to read than programs written for instance in C or Fortran.

Matlab is a software program that allows to do data manipulation and visualization, calculations, math and programming. It can be used to do very simple as well as very sophisticated tasks. Matlab is a high-performance language for technical computing.

Matlab is useful because it simplifies the analysis of mathematical models, it frees you from coding in high-level languages (saves a lot of time - with some computational speed penalties), provides an extensible programming/visualization environment, provides professional looking graphs.

3)DATA representation:

Data representation in Matlab is the feature that distinguishes this environment from others. Everything is presented with matrixes. The definition of matrix by MathWorks is a rectangular array of numbers. Matlab recognizes binary and text files. There is couple of file extensions that are commonly used, for example *.m stands for M-file. There are two kinds of it: script and function M-file. Script file contains sequence of mathematical expressions and commands. Function type file starts with word *function* and includes functions created by the user. Different example of extension is *.mat. Files *.mat are binary and include work saved with command File/Save or Save as [32] (Mrozek & Mrozek, 2001, 64-65).

Since Matlab stores all data in matrixes, program offers many ways to create them. The easiest one is just to type values. There are three general rules:

• the elements of a row should be separated with spaces or commas;

• to mark the end of each row a semicolon '**;**' should be used;

• square brackets must surround whole list of elements.

4. OBSERVATION

Table 4.1: Reading at spot 1 on 2/2/15 during morning

Date -02/02/2015 (Monday) (morning) Place – Rajkamal Square

Sr. No.	Time (am)	No. Of Vehicles	Noise density in db

		2w	3w	4w	4w+	(max.)
1	09.00 - 09.10	20	12	10	04	99.7
2	09.10 - 09.20	19	13	08	05	95.1
3	09.20 - 09.30	23	10	12	06	103.2
4	09.30 - 09.40	18	09	12	04	92.2
5	09.40 - 09.50	19	09	09	02	90.5
6	09.50 - 10.00	20	09	08	02	90.9
7	10.00 - 10.10	25	11	10	01	91.7
8	10.10 - 10.20	24	14	07	00	93.0
9	10.20 - 10.30	28	15	12	02	98.7
10	10.30 - 10.40	31	17	13	04	**103.5**
11	10.40 - 10.50	35	16	11	03	**103.2**
12	10.50 - 11.00	35	17	13	03	**103.0**

Table 4.2 : Reading at spot 1 on 2/2/15 during afternoon

Date -02/02/2015 (Monday) (afternoon) Place – Rajkamal Square

Sr. No.	Time (pm)	No. Of Vehicles				Noise density in db (max.)
		2w	3w	4w	4w+	
1	02.00 – 02.10	20	10	07	03	95.7
2	02.10 - 02.20	18	08	09	02	93.6
3	02.20 – 02.30	17	07	10	02	93.0
4	02.30 – 02.40	22	06	12	04	**99.8**
5	02.40 – 02.50	24	09	09	03	**98.1**
6	02.50 – 03.00	27	12	10	04	**99.9**
7	03.00 – 03.10	25	10	07	02	95.4
8	03.10 – 03.20	25	09	08	01	95.2
9	03.20 – 03.30	22	12	08	05	98.2
10	03.30 – 03.40	18	08	08	03	93.1
11	03.40 – 03.50	17	07	12	03	92.0
12	03.50 – 04.00	21	10	10	04	93.0

Table 4.3 : Reading at spot 1 on 2/2/15 during evening

Date -02/02/2015 (Monday) (evening) Place – Rajkamal Square

Sr. No.	Time (pm)	No. Of Vehicles				Noise density in db (max.)
		2w	3w	4w	4w+	
1	05.00 – 05.10	27	15	10	01	99.9
2	05.10 – 05.20	28	17	12	02	101.9
3	05.20 – 05.30	35	15	10	01	100.1
4	05.30 – 05.40	37	18	14	02	106.1
5	05.40 – 05.50	32	17	11	00	99.0
6	05.50 – 06.00	30	12	15	00	97.1
7	06.00 –06.10	40	18	14	02	**107.0**
8	06.10 – 06.20	29	11	11	01	**104.1**
9	06.20 – 06.30	29	12	13	03	**100.2**
10	06.30 – 06.40	28	14	12	01	98.0
11	06.40 – 06.50	30	14	11	02	98.0
12	06.50 – 07.00	31	10	11	01	99.7

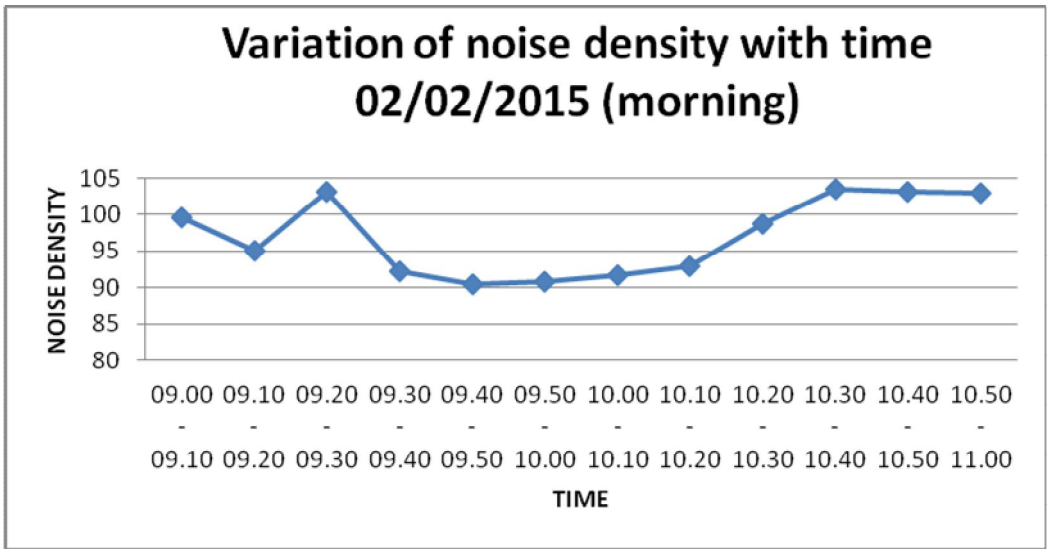

Figure 4.1: Variation of noise density with time on 2/2/15 (morning)

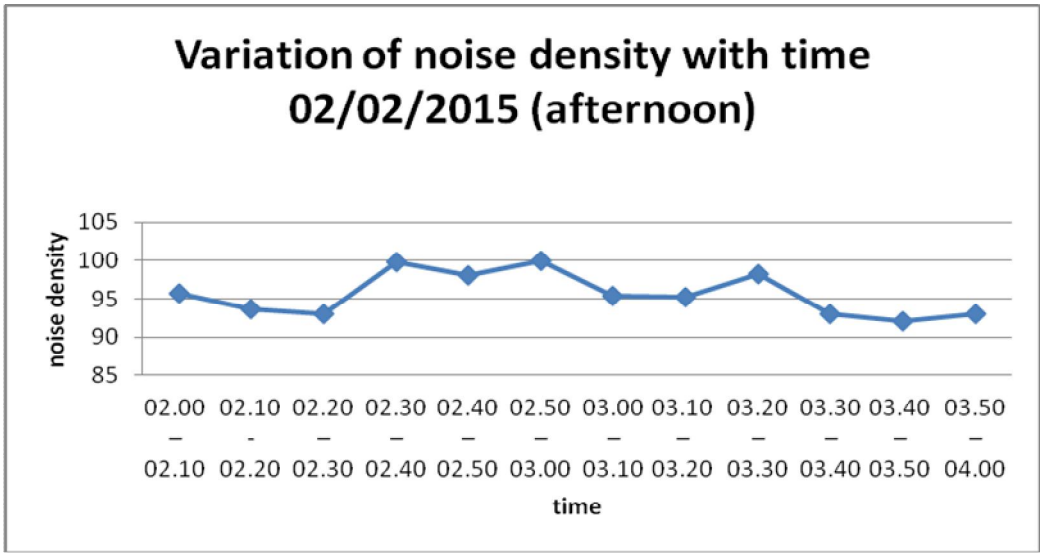

Figure4.2: Variation of noise density with time on 2/2/15 (afternoon)

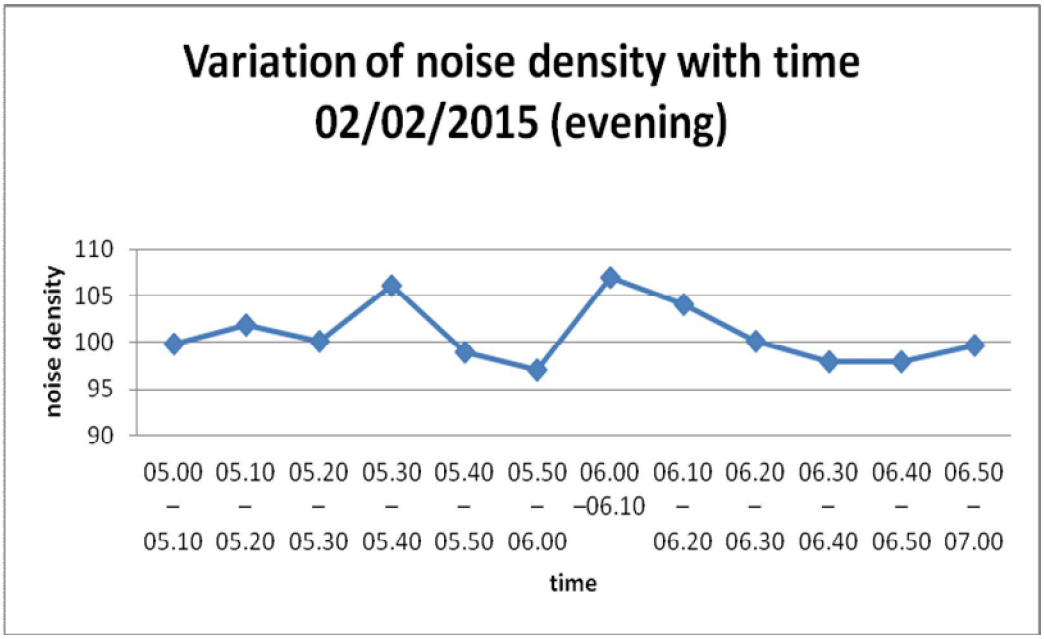

Figure 4.3: Variation of noise density with time on 2/2/15 (evening)

5. PROBABLE IMPLICATIONS

5.1 Technical consideration and barrier effectiveness

Noise barriers are solid obstructions built between the highway and the homes along the highway. Effective noise barriers can reduce noise levels by 10 to 15 decibels, cutting the loudness of traffic noise in half. Barriers can be formed from earth mounds along the road (usually called earth) or from high, vertical walls. Earth has a very natural appearance and is usually attractive. However, earth can require quite a lot of land if it is very high. Walls take less space. They are usually limited to 8 meters in height because of structural and aesthetic reasons. Noise walls can be built out of wood, stucco, concrete, masonry, metal, and other materials. Many attempts are being made to construct noise barriers that are visually pleasing and that blend in with their surroundings.

There are no Federal requirements or regulations related to the selection of material types to be used in the construction of highway traffic noise barriers. Individual select the material types to be used when building these barriers. Normally make this selection based on a number of factors such aesthetics, durability and maintenance, costs, public comments, etc. The material chosen should be rigid and of sufficient density (approximately 20 kilograms/square meter minimum) to provide a transmission loss of 10 dB (A) greater than the expected reduction in the noise diffracted over the top of the barrier. Noise barriers do have limitations. For a noise barrier to work, it must be high enough and long enough to block the view of a road. Noise barriers do very little good for homes on a hillside overlooking a road or for buildings which rise above the barrier. A noise barrier can achieve a 5 dB noise level reduction when it is tall enough to break the line-of-sight from the highway to the receiver and it can achieve an approximate 1.5 dB additional noise level reduction for each meter of height after it breaks the line-of-sight (with a maximum theoretical total reduction of 20 dB (A)). [11]

To avoid undesirable end effects, a good rule-of-thumb is that the barrier should extend 4 times as far in each direction as the distance from the receiver to the barrier. Openings in noise walls for driveway connections or intersecting streets destroy the effectiveness of barriers. In some areas, homes are scattered too far apart to permit noise barriers to be built at a reasonable cost. Noise barriers can be quite effective in reducing noise for receptors within approximately 61 meters of a highway.

Figure 4.4: Earth noise barrier

Figure 4.5: Wooden Noise Barrier

Figure 4.6: Concrete Noise Barrier with Wood grain Texture Noise Barrier Examples

5.2 Public perception

Overall, public reaction to highway noise barriers appears to be positive. There is, however, a wide diversity of specific reactions to barriers. Residents adjacent to barriers have stated that conversations in households are easier, sleeping conditions are better, a more relaxing environment is created, windows are opened more often, and yards are used more in the summer. Benefits include increased privacy, cleaner air, improved view and sense of rural ness, and healthier lawns and shrubs. Negative reactions have included a restriction of view, a feeling of confinement, a loss of air circulation, a loss of sunlight and lighting, and poor maintenance of the barrier. Motorists have sometimes complained of a loss of view or scenic vistas and a feeling of being "walled in" when traveling adjacent to barriers. [12]

5.3 Design consideration

A successful design approach for noise barriers should be multidisciplinary and should include architects/planners, landscape architects, roadway engineers, acoustical engineers, and structural engineers. Noise reduction goals influence acoustical considerations and in conjunction with non-acoustical considerations, such as maintenance, safety, aesthetics, physical construction, cost, and community participation, determine various barrier design options. A major consideration in the design of a noise barrier is the visual impact on the adjoining land use. An important concern is the scale relationship between the barrier and activities along the roadway right-of-way. A tall barrier near a low-scale single family detached residential area could have a severe adverse visual effect. In addition, a tall barrier placed close to residences could create detrimental shadows. One solution to the potential problem of scale relationship is to provide staggered horizontal elements to a noise barrier to reduce the visual impact through introduction of landscaping in the foreground.

The visual character of noise barriers should be carefully considered in relationship to their environmental setting. The barriers should reflect the character of their surroundings as much as possible. Where strong architectural elements of adjoining activities occur in close proximity to barrier locations, a relationship of material, surface texture, and color should be explored in the barrier design. In other areas, particularly those near roadway structures or other transportation elements, it may be desirable that proposed noise barriers have a strong visual relationship, either physically or by design concept, to the roadway elements. Aesthetic views and scenic vistas should be preserved to the extent possible. It is usually desirable to avoid excessive detail which tends to increase the visual dominance of the barrier. At normal roadway speeds, visual perception of noise barriers will tend to be of the overall form of the barrier and its color and surface texture. Due to the scale of barriers, a primary objective to achieve visually pleasing barriers is to avoid a tunnel effect through major variations in barrier form, material type, and surface treatment. [13]

For example, the design problem both from an acoustic and visual standpoint is substantially different for a straight roadway alignment with narrow right-of-way and little change in vertical grades than for a roadway configuration with a large right-of-way and variations in horizontal and vertical alignments. In the former case, the roadway designer is limited in the options of visual design to minor differences in form, surface treatment, and landscaping. From both a visual and a safety standpoint, noise barriers should not begin or end abruptly. Other concepts include bending back and slopping the barrier, curving the barrier in a transition form, stepping the barrier down in height, and terminating the barrier in a vegetative planter. The concept of terminating the barrier in a vegetative planter should only be utilized in areas where climatic conditions are conducive to continued vegetative growth and in areas where the planter edges will be protected from potential conflict with roadway traffic. Graffiti on noise barriers can be a potential problem. A possible solution to this problem is the use of materials which can be readily washed or repainted. Landscaping and

plantings near barriers can be used to discourage graffiti as well as to add visual quality. Highway traffic noise levels are not substantially increased by construction of a noise barrier on the opposite side of a highway from a receiver. [13] [14]

5.4 Flexibility in design making

The Federal-aid highway program has always been based on a strong State-Federal partnership. At the core of that partnership is a philosophy of trust and flexibility, and a belief that the States are in the best position to make investment decisions that are based on the needs and priorities of their citizens. The FHWA noise regulations give each flexibility in determining the reasonableness and feasibility of noise abatement and, thus, in balancing the benefits of noise abatement against the overall adverse social, economic, and environmental effects and costs of the noise abatement measures. The must base its determination on the interest of the overall public good, keeping in mind all the elements of the highway program. Congress affirmed and extended the philosophy of partnership, trust, and flexibility in the enactment of ISTEA. [14]

5.5 Vegetation

Vegetation, if it is high enough, wide enough, and dense enough that it cannot be seen through, can decrease highway traffic noise. A 61-meter width of dense vegetation can reduce noise by 10 decibels, which cuts in half the loudness of traffic noise. It is usually impossible, however, to plant enough vegetation along a road to achieve such reductions. Roadside vegetation can be planted to create a psychological relief, if not an actual lessening of traffic noise levels. The planting of trees and shrubs provides only psychological benefits and may be provided for visual, privacy, or aesthetic treatment, not noise abatement.

5.6 Vegetation and noise reduction

Traffic Management controlling traffic can sometimes reduce noise problems. For example, trucks can be prohibited from certain streets and roads, or they can be permitted to use certain streets and roads only during daylight hours. Traffic lights can be changed to smooth out the flow of traffic and to eliminate the need for frequent stops and starts. [15] [16]

5.7 Buffer zone

Buffer zones are undeveloped, open spaces which border a highway. Buffer zones are created when a highway agency purchases land or development rights, in addition to the normal right-of-way, so that future dwellings cannot be constructed close to the highway. This prevents the possibility of constructing dwellings that would otherwise have an excessive noise level from nearby highway traffic. An additional benefit of buffer zones is that they often improve the roadside appearance. However, because of the tremendous amount of land that must be purchased and because in many cases dwellings already border existing roads, creating buffer zones is often not possible. [15]

5.8 Pavement

Pavement is sometimes mentioned as a factor in traffic noise. While it is true that noise levels do vary with changes in pavements and tires, it is not clear that these variations are substantial when compared to the noise from exhausts and engines, especially when there are a large number of trucks on the highway. Additional research is needed to determine to what extent different types of pavements and tires contribute to traffic noise. It is very difficult to forecast pavement surface condition into the future. Unless definite knowledge is available on the pavement type and condition and its noise generating characteristics, no adjustments should be made for pavement type in the prediction of highway traffic noise levels. [15]

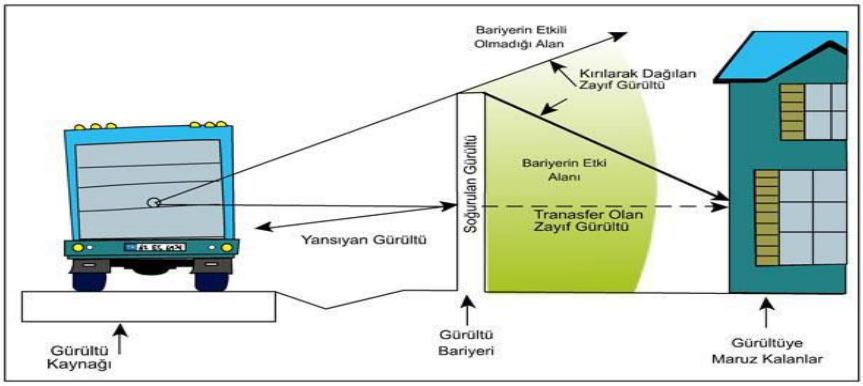

Figure 4.7 : Design of Pavement Barrier

6. RESULT AND DISCUSSIONS

In the present work, an attempt was made for comprehensive study of traffic noise on highway at and around the Amravati city during morning, afternoon, and evening during 2014 - 2015. The traffic noise was measured about 4 different Spots along the National Highway at and around city. The minimum and maximum noises level observed were 52.9 dB and maximum 104.5 dB. The sources of noise pollution were motor vehicular traffic.

So ,overall traffic noise generation is analyzed using mat-lab software. In that we have given respective road traffic noise of vehicles in accordingly, code develop in mat-lab software has shown respective suggestion of different places such as plantation of trees, pavement, barrier required or not required.

It indicates more noise pollution due to traffic load. Heavy vehicles were coupled with commercial activities. It was observed from data that lower noise pollution was recorded over three times measured. Engineering Collages and Hospitals are located on the either sides of road. Similar trend was also observed on highway and in the city during measurement of noise level. Attempt were also made to measure the noise generated from various vehicles in order to assess their contribution to noise pollution and know the status of the engine and air horn of particular vehicle as episodic and impulsive noise.

The motor cycles noticed 22% maximum sound as compared to standard. However, the numbers of two wheelers are increasing alarmingly day-by-day adding noise to road. It is noticed that none of the vehicle generated sound within the prescribed limits i.e. 70 dB (A) during the study period. The control measures should be adopted to minimize the noise level; the government also has a great role to play in this regard.

7. CONCLUSION

This study was carried out to evaluate the environmental noise pollution in the Amravati City due to traffic noise. Very high environmental noise levels due to traffic of vehicles were observed during the study causing disturbance and even some health problems. Basing on the study findings it can be inferred that there is an urgent need to set up noise standards in the country to control the noise pollution. A focused study of examining hearing loss and health survey is warranted. The highlights in brief and severity of noise pollution at Amravati was disseminated by a popular article submitted for national and local news papers, The news media carried the findings of the study and this effort facilitated to create an awareness among common public Residing in the Amravati city.

Some other suggestions such as planting trees on both sides of the road, banning hydraulic horns, improvement and streamlining of roads and parking system, discouragement of high sound producing vehicles, industries and public awareness would also be helpful in reduction of the present noise level in Amravati. The role of NGOs, researchers and professionals, media and concerned individuals is significant in minimizing the environmental hazard of noise pollution. As Amravati strives towards achieving adequate health care for the populace, the college and learning environment must not be neglected.

The most reported health problems potentially associated with acute (large or episodic) and/or chronic (continuous or intermittent) exposure to noise within the school environment were lack of concentration and tiredness. Evidence has suggested that noise in learning environments has considerable effects on the learning abilities and the general productivity of children in terms of their academic performance as compared to children in continues learning environments. Therefore, this study should inform future, more rigorous longitudinal research with repeated measures across seasons, indoors and outdoors, in colleges as well as collaborative efforts by government agencies and education stakeholders for policy formulation and implementation.

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